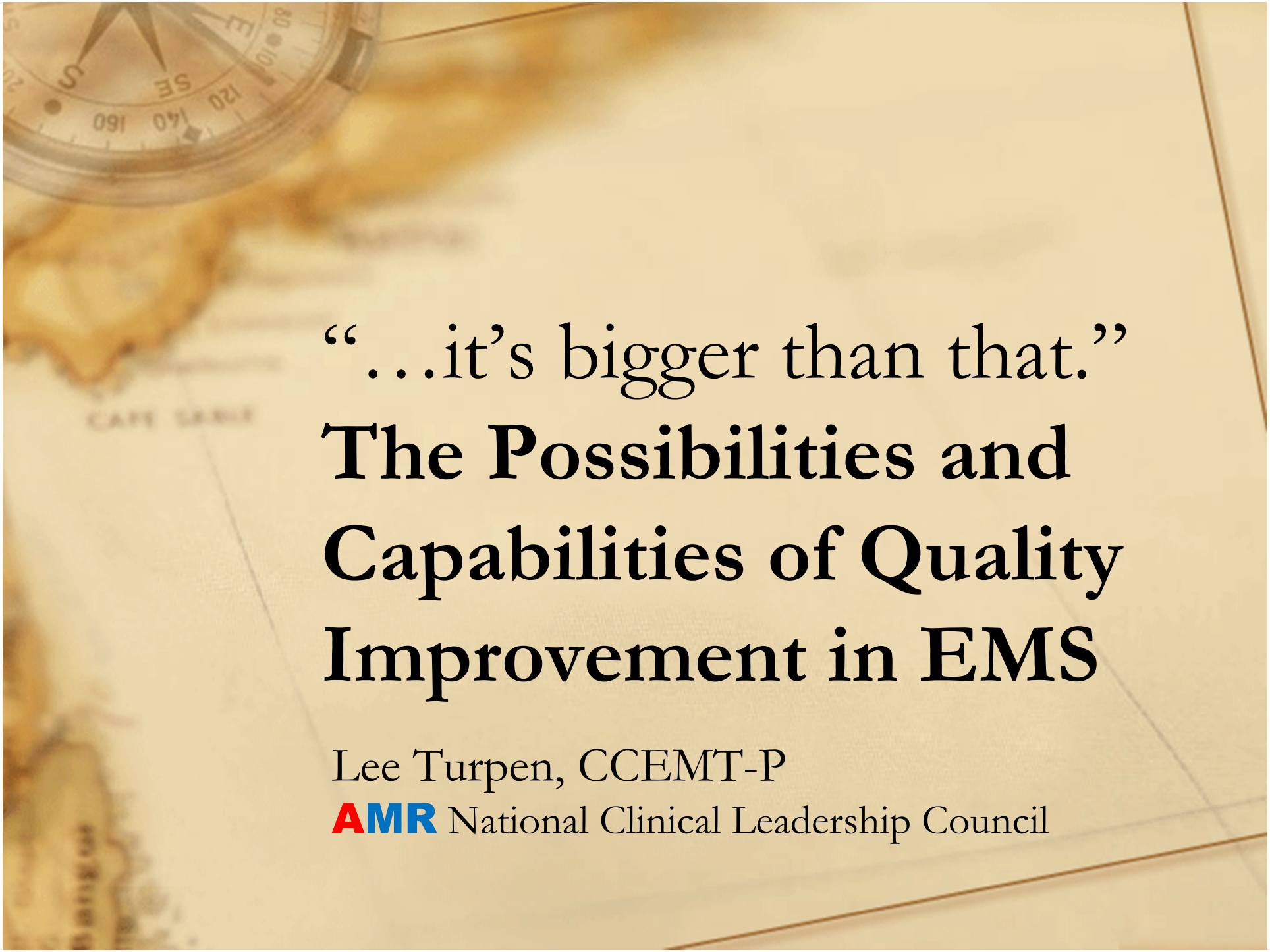


"…it's bigger than that."
The Possibilities and Capabilities of Quality Improvement in EMS

Lee Turpen, CCEMT-P
AMR National Clinical Leadership Council

Disclaimer

- History
- The size of your service doesn't matter – Drive to improve does
- No body lives in a perfect world
- Silo integrity

“Quality Improvement”

- Vascular Access Success
- Intubation Success
- Protocol Deviations
- Cardiac Arrest “Saves”
- Percentage of charts reviewed
- Response Times
- Feedback

- **"In EMS, we continue to personally define ourselves by the skills that we do. This must stop. EMS will never be truly defined as medical practice until we define ourselves by the outcomes that we deliver."**
  - Statement from the U. S. Metropolitan Consortium of EMS Medical Directors during the 2013 EMS State of the Sciences Conference

Tests of Change

- Vascular Access – Intravenous
  - IV Catheter Brand A 92-93% monthly success rate
  - Looked specifically at features and costs
  - Selected brand B for test of change based on what was believed to be the best features
  - First month, lower success
  - Next 8 months showed 94-95% monthly success rate
  - Brand B total cost was less due to fewer unsuccessful starts even though individual cost was higher
  - Fewer complaints of IV start pain

IHI "Triple Aim"

- Improve the health of populations
- Improve the patient experience
- Reduce the cost of healthcare

Sentinel Events

- Best if scored by a FMEA process
- Examples:
- Mission Failure
- Radio Failure
- Medical Equipment Failure
- Medical Misadventure
- Failure to Respond

Sentinel Events

- Specify how long to closure
- What is expected at closure?
- Who is notified?
- Who is responsible to manage?
- AAR
- How is it measured to insure improvement?

What else drives improvement?

- Where are the opportunities for improvement that affect the Triple Aim?
- Clinical Medicine (everyone gets that)
- Safety Culture
- Meaningful time-on-task reduction
- Reliable Infrastructure (think technology/fleet)
- Workforce Development – EDUCATION/COMPETENCY

Fleet Scenario

- Vehicle failures
  - RTA Coding
  - Tire Replacement vs. Tire Failure
  - Tire failure occurrence reported to be greater than total mission failures
  - Noted upon database work order audit, numerous 2-tire replacements coded as Tire Failures
  - Found a single mechanic miscoding work orders
  - Re-education
  - Far fewer actual failures that reported, data silo more accurate

Punish the guilty?

- The four "R's"
  - Rescue
  - Review
  - Remediate
  - Reinstate
- Keep it confidential

"JUST CULTURE"

Improvement Process

Just pick one…

- Pick one or two improvement processes and become good at them
- Put them in a QI Plan known to all
- Expand as you learn
- Use large scale analysis when you can, BUT…
- Never forget the effectiveness of small tests of change

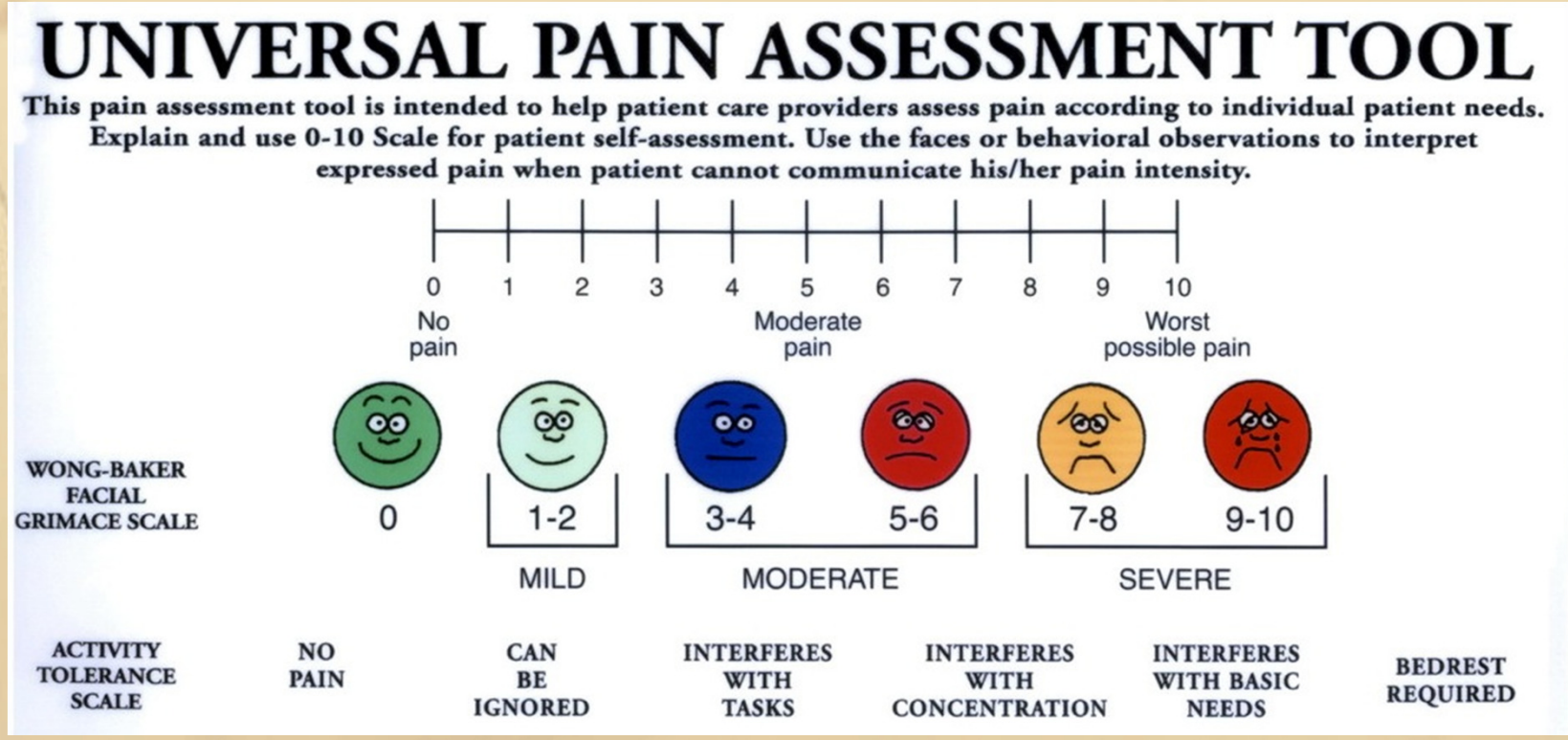
Small Tests of Change

- The flagship process of the IHI Triple Aim
- Start small, act fast, change often
- Duplicate success, change with each success

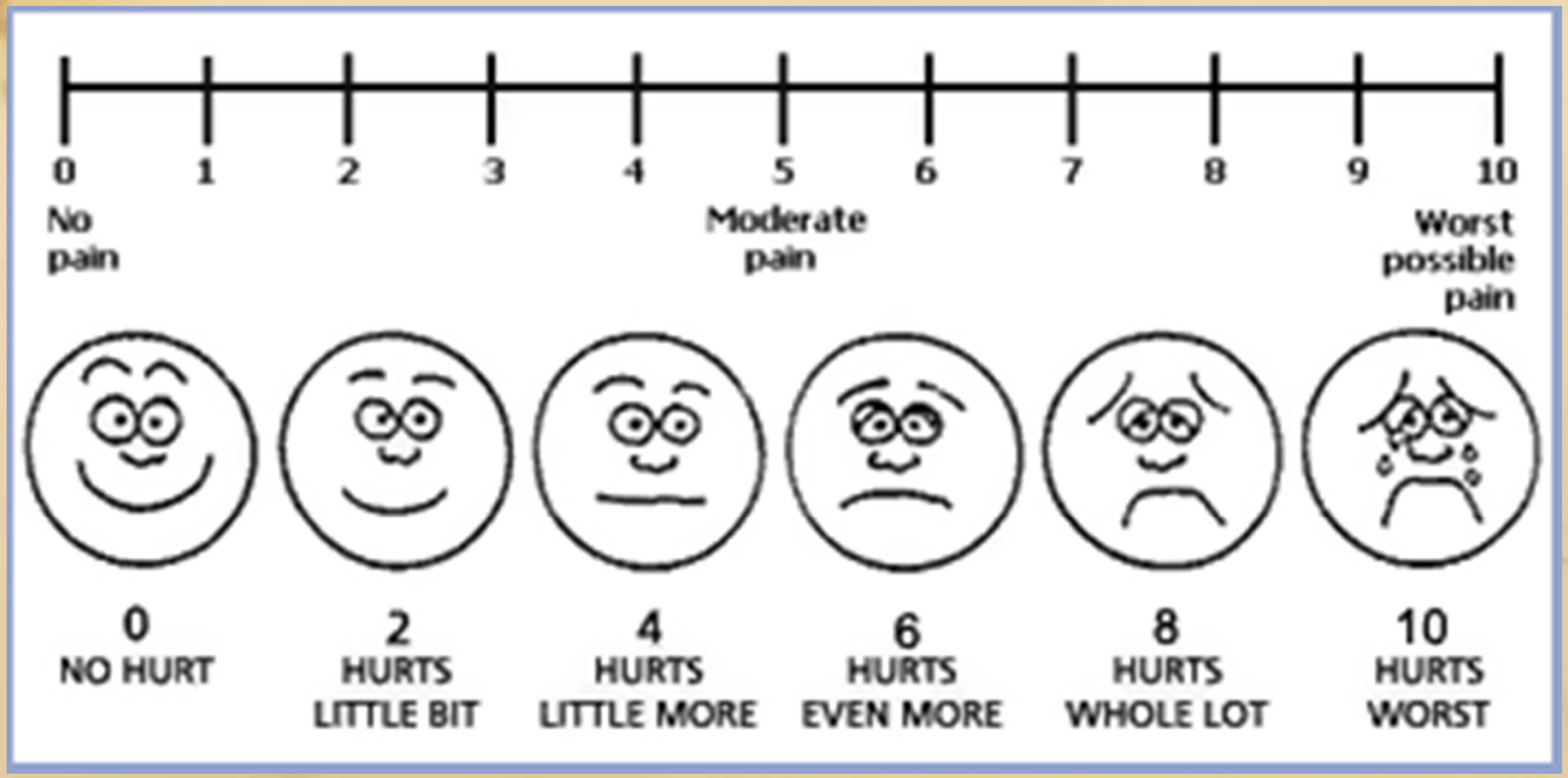
Small Test of Change Example

- Caring for Maria
- TTM & OTTMT
- Reduction of Pain & Suffering
- How do we measure pain in the prehospital environment?
- Is it reliable? Is it accurate? Can it be a highly variable measurement?

Small Test of Change



Small Test of Change

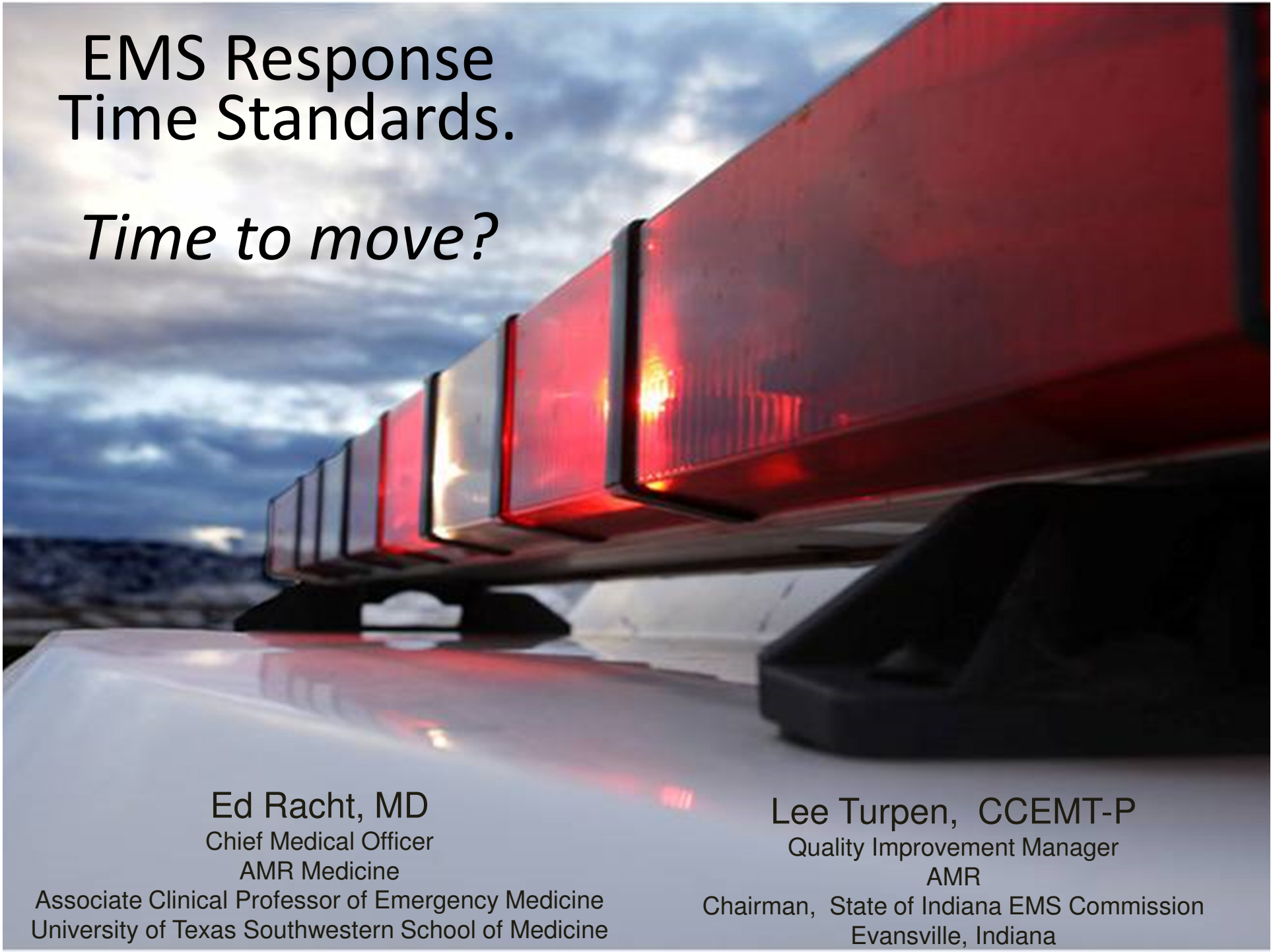


Small Test of Change Result

- Nine small tests of change were conducted resulting in large, simplified visual scale with simple script.
- Patient and caregiver feedback was crucial
- Overall practice pain measurement can be applied in a like manner
- Now tests of practice pain reduction can be more actively measured

Let's look at something a lot bigger…

What do you do when the need for change is thrust upon you?



EMS Response Time Standards.

Time to move?

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Chairman, State of Indiana EMS Commission
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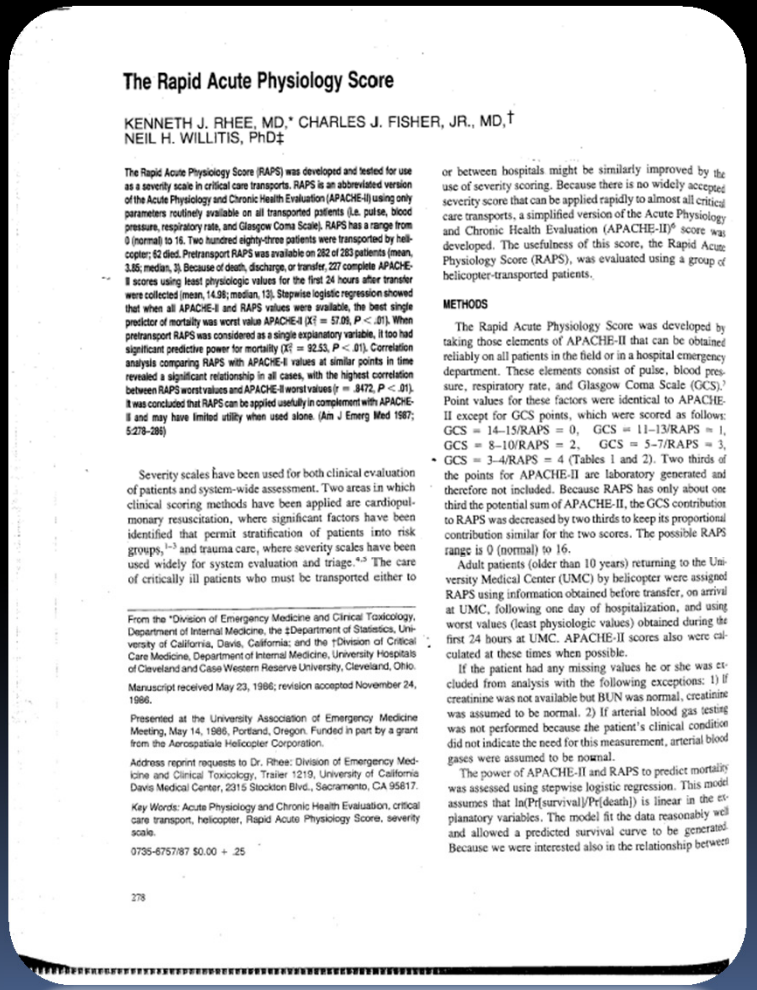
RAPID ACUTE PHYSIOLOGY SCORE

- Developed and tested as a severity score for critical care transports
- Abbreviated version of APACHE II using only parameters available in the field
- Pulse, B/P, RR, GCS
- Scoring 0 (normal) to 16

RAPS



The Rapid Acute Physiology Score

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NEIL H. WILLITIS, PhD‡

The Rapid Acute Physiology Score (RAPS) was developed and tested for use as a severity scale in critical care transports. RAPS is an abbreviated version of the Acute Physiology and Chronic Health Evaluation (APACHE-II) using only parameters routinely available on all transported patients (i.e. pulse, blood pressure, respiratory rate, and Glasgow Coma Scale). RAPS has a range from 0 (normal) to 16. Two hundred eighty-three patients were transported by helicopter; 62 died. Pretransport RAPS was available on 282 of 283 patients (mean, 3.85; median, 3). Because of death, discharge, or transfer, 227 complete APACHE-II scores using least physiologic values for the first 24 hours after transfer were collected (mean, 14.98; median, 13). Stepwise logistic regression showed that when all APACHE-II and RAPS values were available, the best single predictor of mortality was worst value APACHE-II ($X^2 = 57.05$, $P < .01$). When pretransport RAPS was considered as a single explanatory variable, it too had significant predictive power for mortality ($X^2 = 92.53$, $P < .01$). Correlation analysis comparing RAPS with APACHE-II values at similar points in time revealed a significant relationship in all cases, with the highest correlation between RAPS worst values and APACHE-II worst values ($r = .8472$, $P < .01$). It was concluded that RAPS can be applied usefully in complement with APACHE-II and may have limited utility when used alone. (Am J Emerg Med 1987; 5:278–286)

Severity scales have been used for both clinical evaluation of patients and system-wide assessment. Two areas in which clinical scoring methods have been applied are cardiopulmonary resuscitation, where significant factors have been identified that permit stratification of patients into risk groups,[1–3] and trauma care, where severity scales have been used widely for system evaluation and triage.[4–5] The care of critically ill patients who must be transported either to or between hospitals might be similarly improved by the use of severity scoring. Because there is no widely accepted severity score that can be applied rapidly to almost all critical care transports, a simplified version of the Acute Physiology and Chronic Health Evaluation (APACHE-II)[6] score was developed. The usefulness of this score, the Rapid Acute Physiology Score (RAPS), was evaluated using a group of helicopter-transported patients.

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Key Words: Acute Physiology and Chronic Health Evaluation, critical care transport, helicopter, Rapid Acute Physiology Score, severity scale.

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METHODS

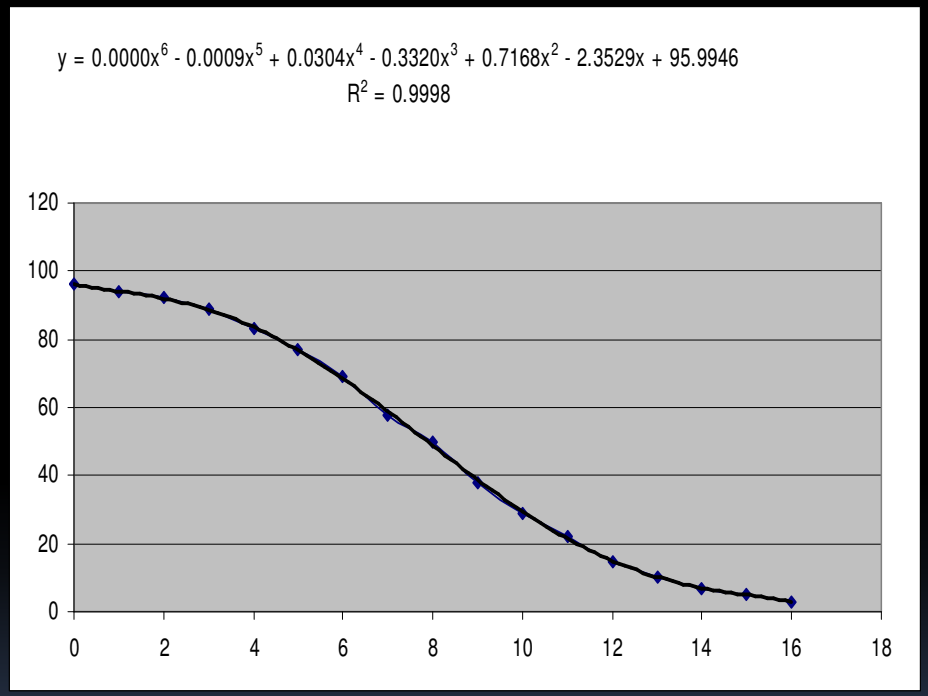
The Rapid Acute Physiology Score was developed by taking those elements of APACHE-II that can be obtained reliably on all patients in the field or in a hospital emergency department. These elements consist of pulse, blood pressure, respiratory rate, and Glasgow Coma Scale (GCS).[7] Point values for these factors were identical to APACHE-II except for GCS points, which were scored as follows: GCS = 14–15/RAPS = 0, GCS = 11–13/RAPS = 1, GCS = 8–10/RAPS = 2, GCS = 5–7/RAPS = 3, GCS = 3–4/RAPS = 4 (Tables 1 and 2). Two thirds of the points for APACHE-II are laboratory generated and therefore not included. Because RAPS has only about one third the potential sum of APACHE-II, the GCS contribution to RAPS was decreased by two thirds to keep its proportional contribution similar for the two scores. The possible RAPS range is 0 (normal) to 16.

Adult patients (older than 10 years) returning to the University Medical Center (UMC) by helicopter were assigned RAPS using information obtained before transfer, on arrival at UMC, following one day of hospitalization, and using worst values (least physiologic values) obtained during the first 24 hours at UMC. APACHE-II scores also were calculated at these times when possible.

If the patient had any missing values he or she was excluded from analysis with the following exceptions: 1) If creatinine was not available but BUN was normal, creatinine was assumed to be normal. 2) If arterial blood gas testing was not performed because the patient's clinical condition did not indicate the need for this measurement, arterial blood gases were assumed to be normal.

The power of APACHE-II and RAPS to predict mortality was assessed using stepwise logistic regression. This model assumes that ln(Pr[survival]/Pr[death]) is linear in the explanatory variables. The model fit the data reasonably well and allowed a predicted survival curve to be generated. Because we were interested also in the relationship between

Based on Rhee's Work

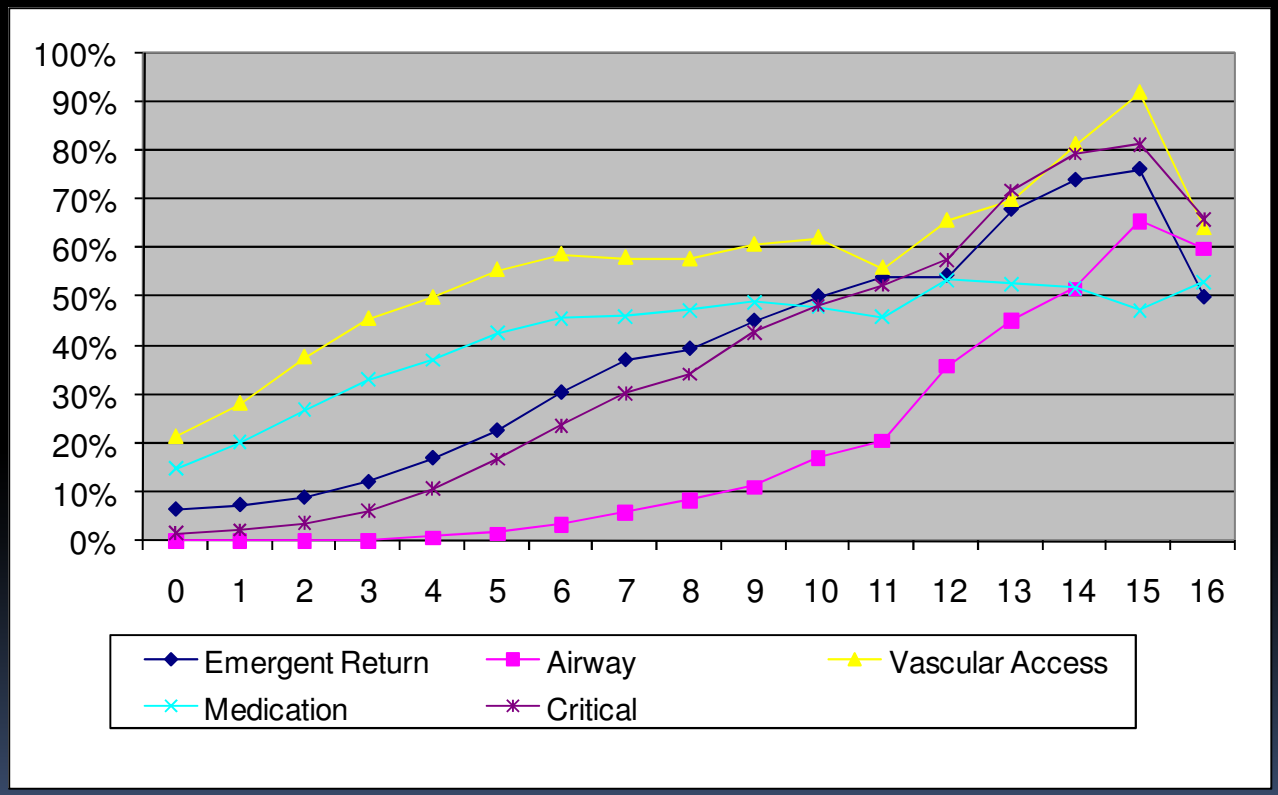


RAPS	Survival %
0	96
1	94
2	92
3	89
4	83
5	77
6	69
7	58
8	50
9	38
10	29
11	22
12	15
13	10
14	7
15	5
16	3

Emergent procedure / returns by RAPS

2006-2008

750,000 Patients



Evansville, Indiana

- City Population 117,429 (2010)
- MSA Population 350,261
- 40.7 Square Miles
- 44 Paramedics, 41 EMTs
- 28,000 calls / year

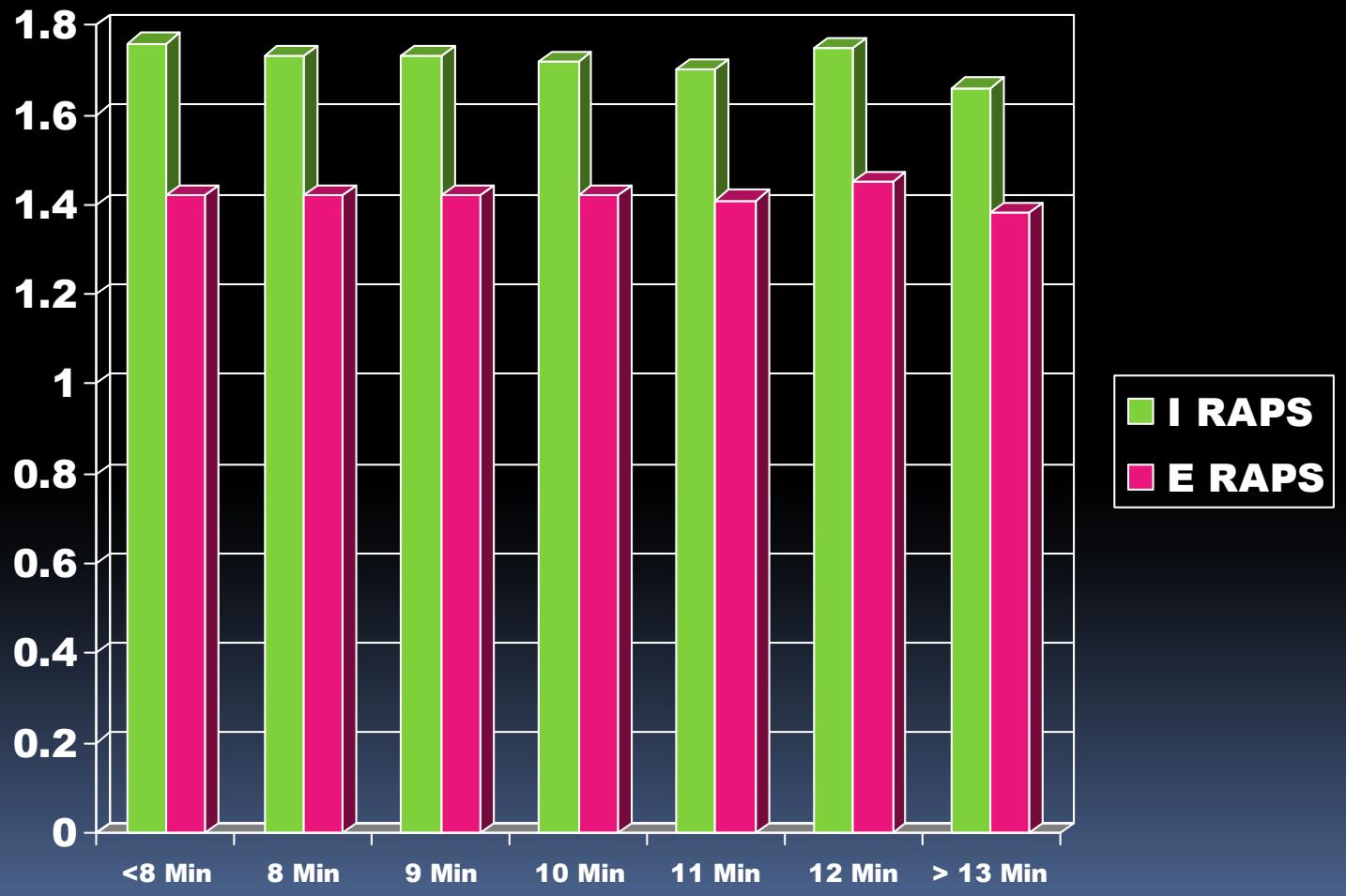
The Story

- “The EMS subsidy is being eliminated” – Local Government
- Can we lengthen response times and do no harm?
- How do we answer the question?
- The RAPS option
- The First Response Protocol
  - Initially cardiac arrest and unconscious

Data

Original Database 11-1-06 to 10-31-08	**1,077,666**
Remove non emergent calls	**-423,679**
Emergent to Scene	**653,987**
Remove Non Transported Calls	**-142,404**
Transported	**511,583**
Record Number used in Report	**269,364**

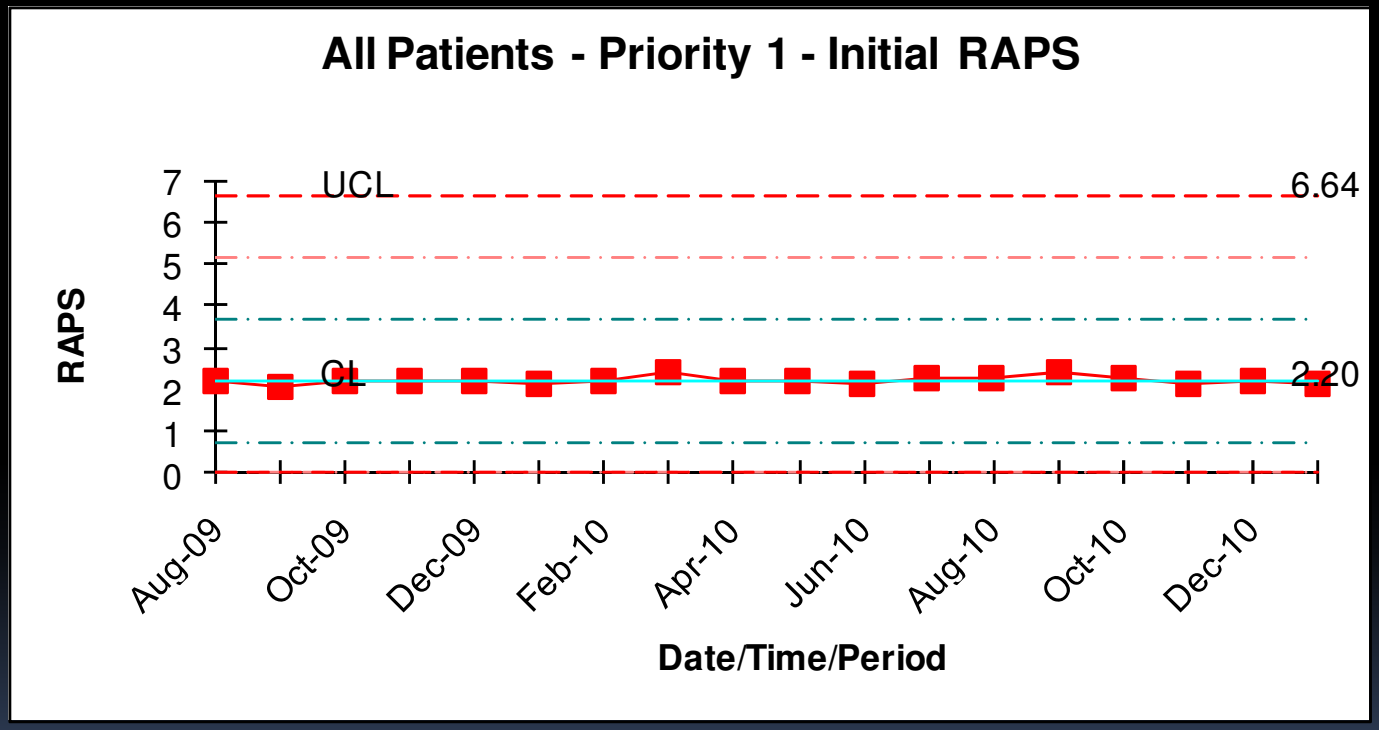
Initial-Ending RAPS by Response Time – All Calls



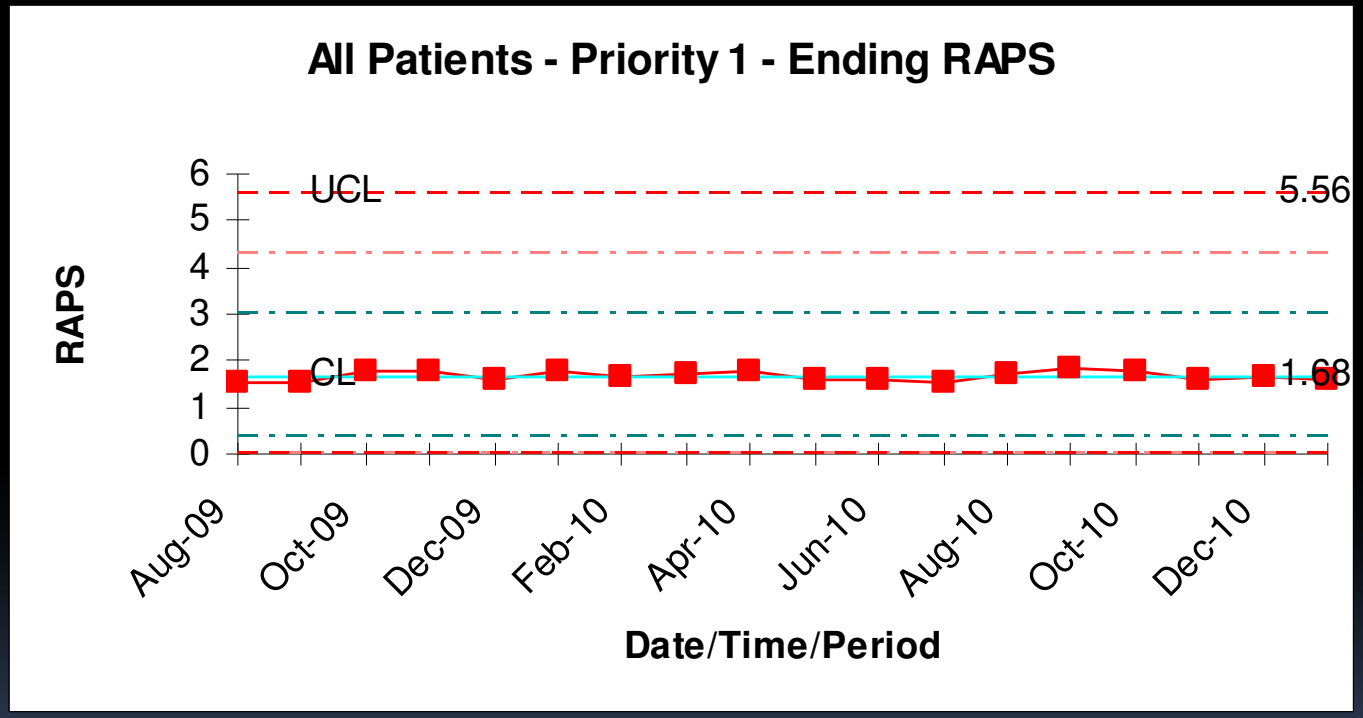
The Proposal

- Lengthen response time requirement (October 09)
  - Decrease unit hours deployed
  - Increased first response to EMD Echo / Delta
- Use RAPS as the alert mechanism to system degradation
  - One Standard Deviation
- Create clinical oversight board
- All clinical participants a part of the initiative

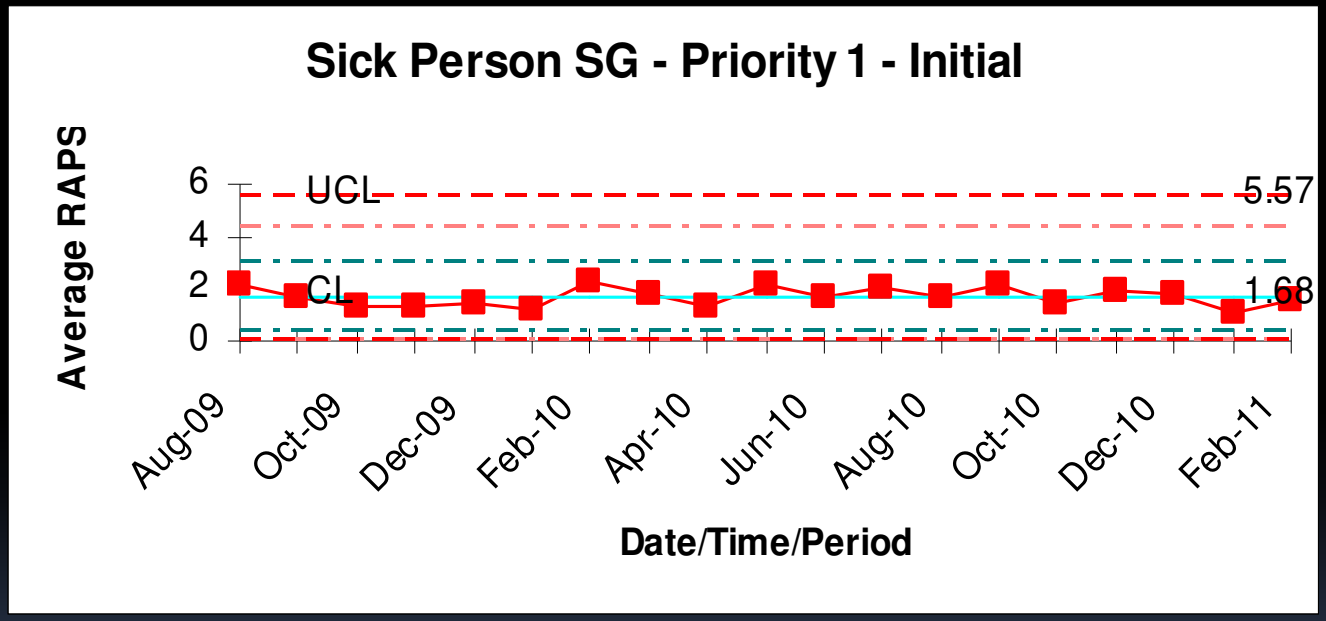
Priority Drill Down



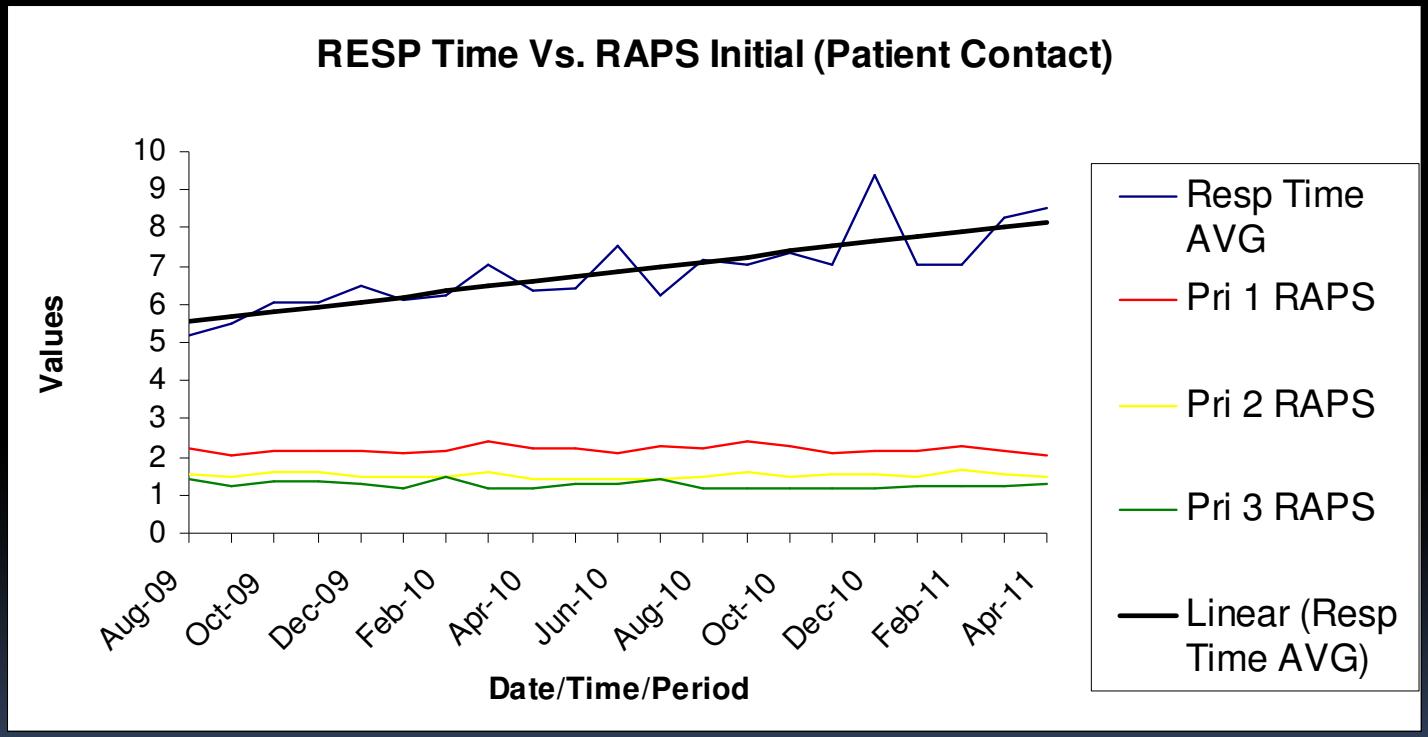
Priority Drill Down



By Super Group



Response Time Overlay



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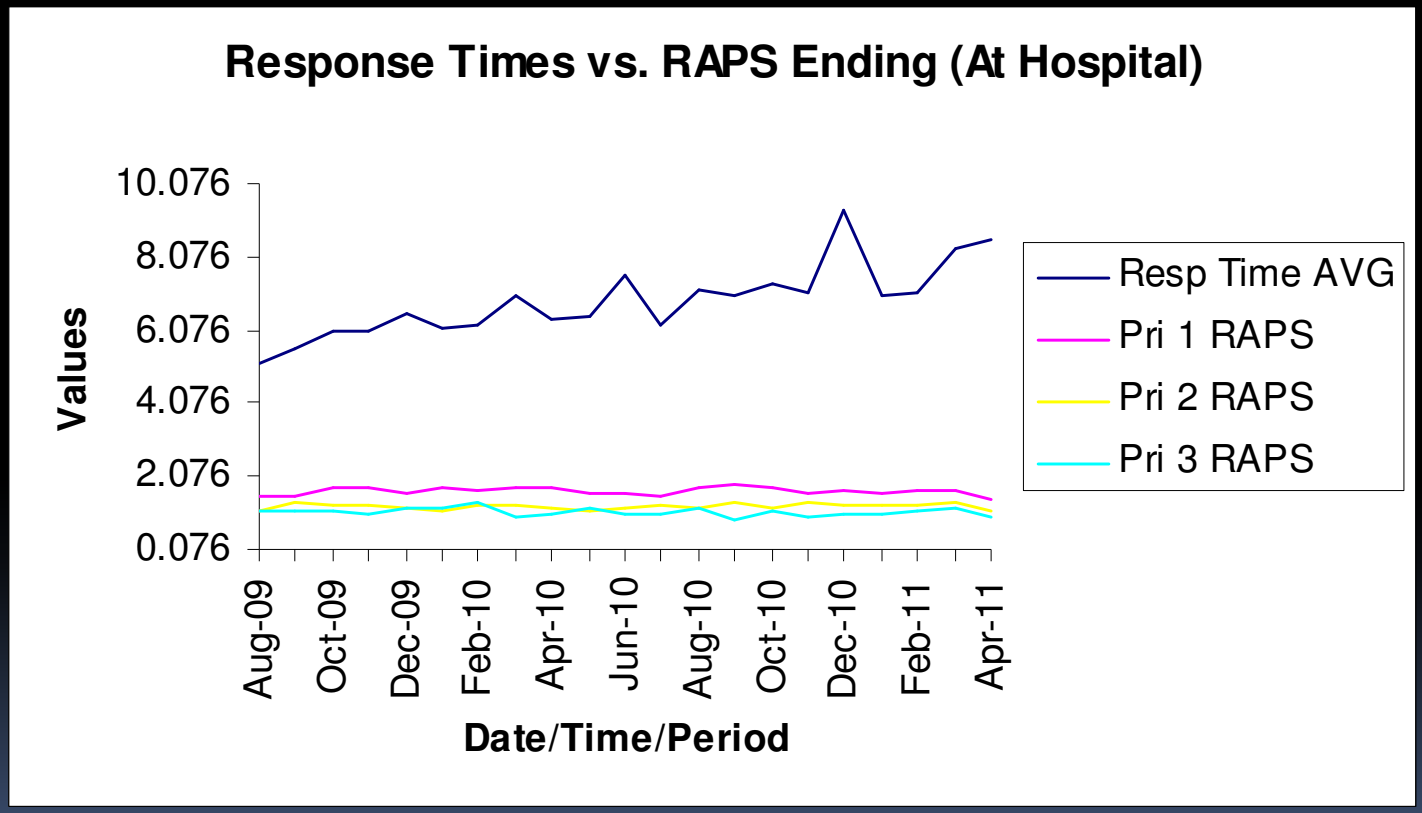
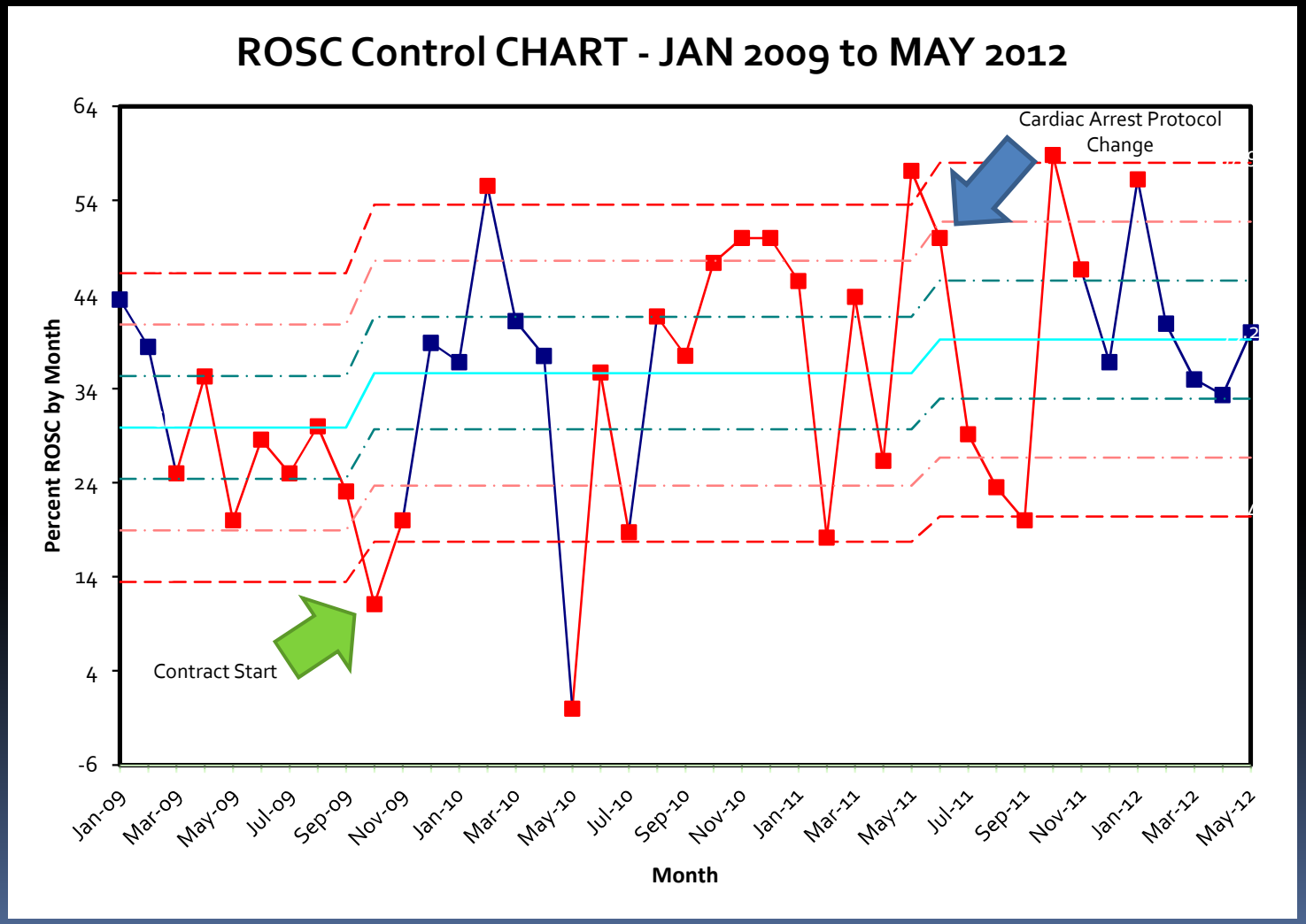
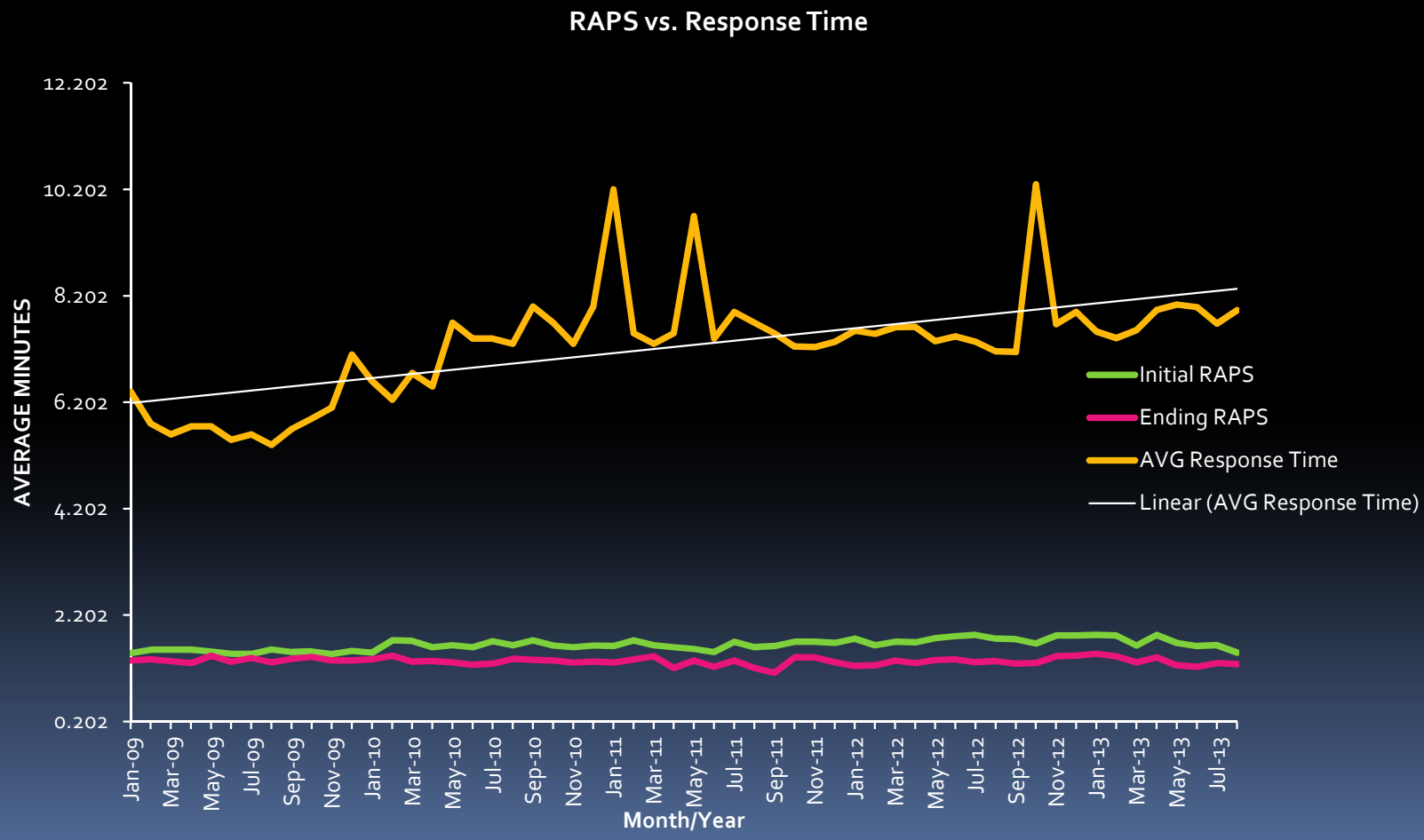


ROSC During Data Collection



Initial and Ending RAPS vs. Aggregate Response Time



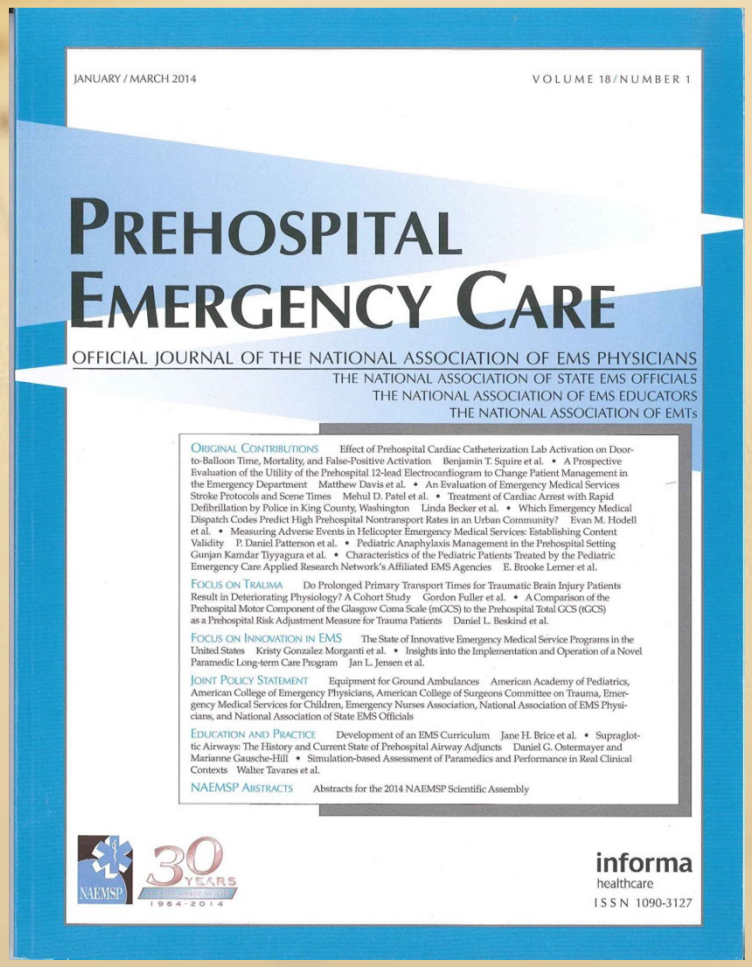
Findings…

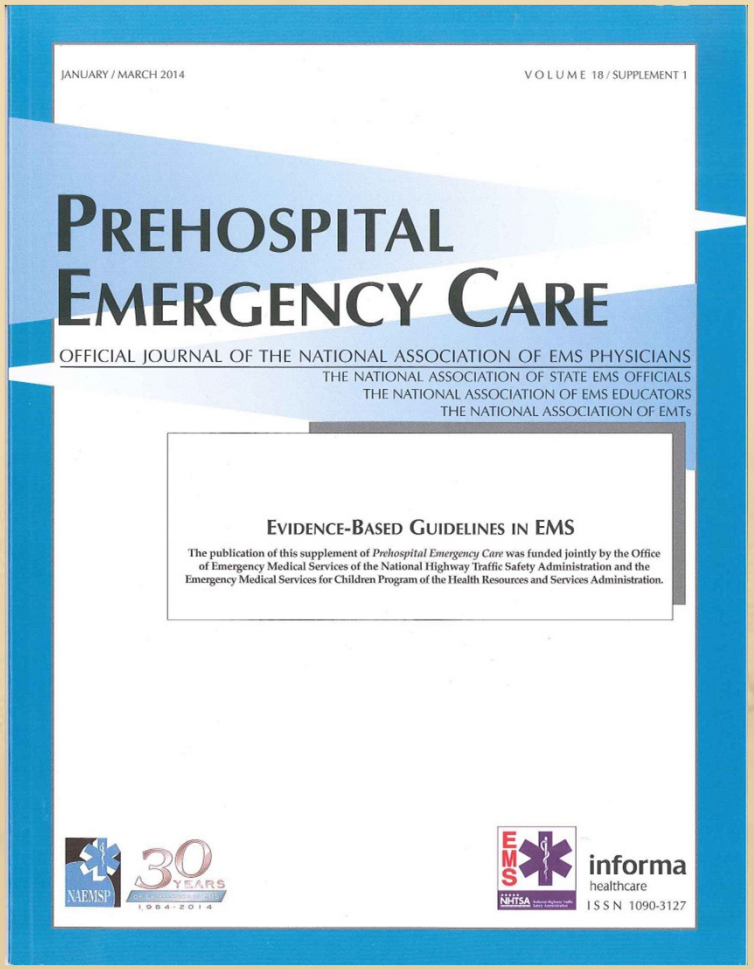
- Some impact of changing response intervals can be prospectively evaluated using historical data
- Some impact of changing response intervals can be monitored using ongoing data
- On the aggregate, response intervals in Evansville were safely increased with no impact on system-wide physiologic parameters

Practice Agility

- Indiana is one of the best states for Agility…
- …when the practice has the right Medical Director and Supervising Hospital combination
- Medicine is changing fast
- We have more data than we can possibly analyze

Why is Practice Agility important?





The day after…

- Pediatric Seizure Evidence-based Algorithm
- Check Glucose prior to treatment
- Large patient field, retrospective study shows less than 3% of seizure patients, including pediatrics are hypoglycemic
- What does this tell us?
- Agility gives us the ability to introduce change quickly

The future…

- The phrase of, "The next protocol set will have…" will be a thing of the past
- Already seeing changes in protocols every few months
- Electronic platforms and social media are already playing a big role in field education and evidence-based content distribution

A few notes…

- Board Certification
- NAEMSP Medical Director's Course
- Ask questions… YOU ARE THE MEDICAL DIRECTOR!
- Get on the Truck
- Get your field people reading the right stuff
- Look for study size, NNT, conclusions and limitations! Has it been duplicated?

And a few more…

- Get in CARES… yesterday
- Your facts are wrong
- Educate in small chunks delivered frequently
- Foster relationships (you do not have to do it all – get your key people on the STEMI, Stroke and Trauma committees)
- Supervising Hospital synergism is crucial to success

Leadership

- Remember that the sole purpose of leadership is to create more leaders
- When it comes to the outcome, you are the leader
- Be agile
- Beware the words “Stagnant” and “Lowest Common Denominator”